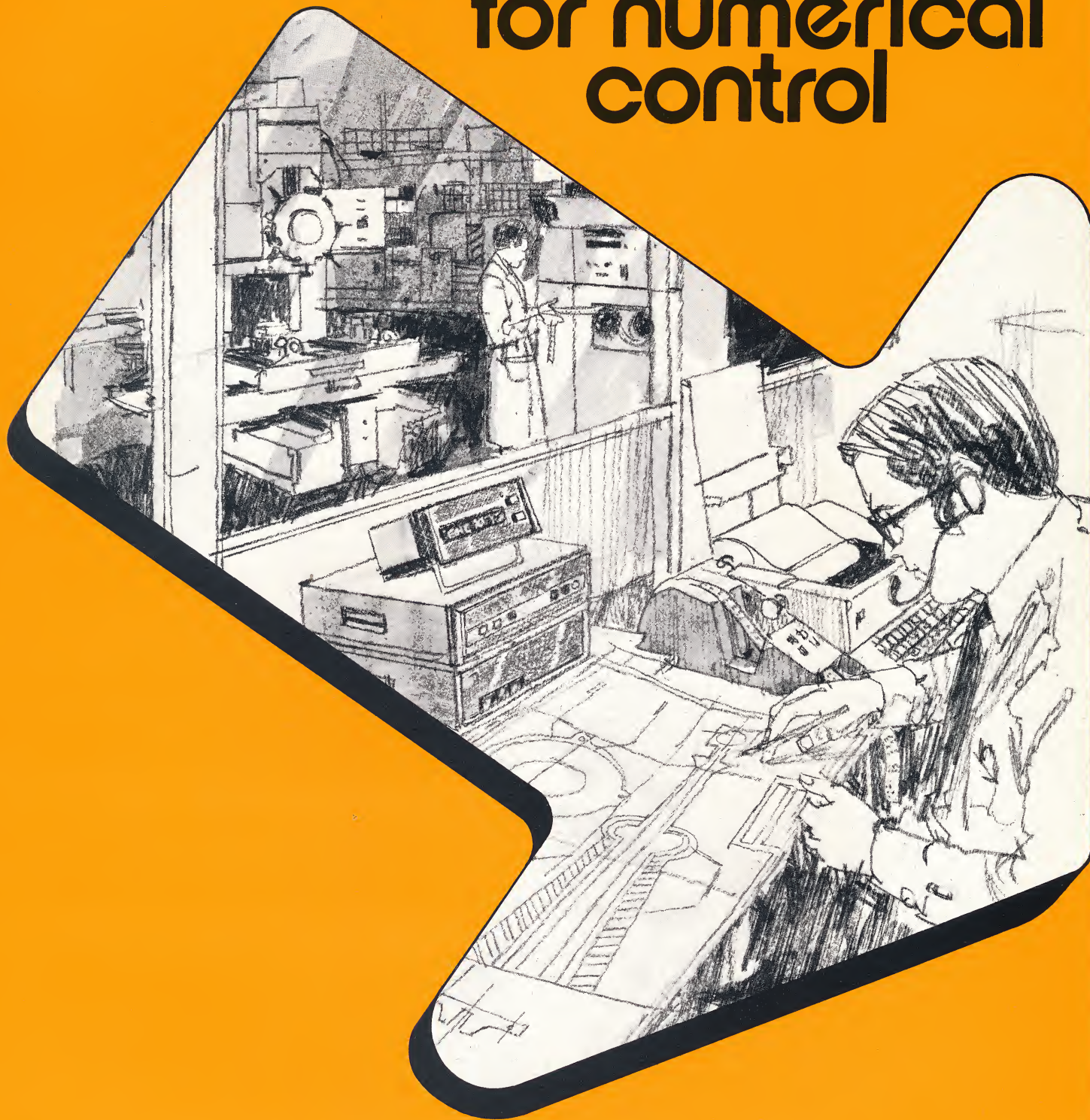




New 75

INTRODUCING A NEW DIMENSION
IN MANUFACTURING CONTROL

voice programming for numerical control





voice programming.

VOICE PROGRAMMING OPENS NEW HORIZONS FOR MANUFACTURING CONTROL

Voice Programming for Numerical Control (VNC) is an innovative, sensible approach to the human interface problems associated with parts programming and NC tape preparation. In order to simplify the task of programming for NC, the most recent programming languages have used English-like instruction sets, whenever possible. Threshold Technology Inc. has taken the ultimate step toward an easy-to-learn NC programming system—DIRECT VOICE INPUT.

With Threshold's VNC-100 system the operator simply speaks each programming command directly to the machine. The words used can be those most familiar to the NC user, and he may generate his program tape merely by reading the information contained in a print or drawing. As the programmer speaks each programming command in sequence, the VNC-100 automatically "decodes" the information into a machine-compatible format and punches the NC tape. Voice programming enables factory personnel with little or no programming experience to quickly prepare a fully verified, punched tape for NC machine tools.

Advanced programming skills are no longer required and turnaround time for NC tape is reduced. There is no need for manually written worksheets, keying operations, or delays waiting for information to be processed. Consequently, parts programming time and costs can be drastically reduced.

SIMPLIFIED NC TAPE PREPARATION

The development of VNC has resulted from increasing demands for more cost efficient, time-saving methods of preparing NC tapes. The VNC-100 fills the needs for a programming system for those parts which do not require higher-level NC languages, but which are time consuming by manual methods. Instead of laboriously writing down all required instructions for parts programs, or typing them according to a rigid programming format, the programmer can simply speak each programming step into a microphone.

When a programmer is first assigned to the Threshold VNC system, he quickly trains it to recognize his voice simply by repeating each word in the NC vocabulary five to ten times.

The parameters associated with his (or her) pronunciation of each word are filed in memory for later matching and identification. Various dialects, accents and even different languages pose no problem. As an option, multiple talkers may be stored simultaneously in memory and the parts programmer simply would dial or key his identification number to activate his training data.

The VNC-100 recognizes each spoken instruction and prepares NC tapes through conversational interaction between the programmer and the system. The simplicity of the spoken entries and this prompting feedback from the VNC result in rapid generation of NC tapes by programmers who need only know blueprint specifications, rather than a complex programming language. The VNC-100 automatically processes and formats the programmer's commands, produces a punched tape for the proper machine tool and provides immediate visual verification of voice commands to the programmer. **All of these automatic steps reduce the possibility for error.** In addition, a built-in editing capability allows the programmer to immediately correct any errors made while inputting his program.



... the ultimate step towards simplifying communications between man and machine

Threshold's VNC-100 eliminates the need for complex keyboards and advanced programming skills. In addition, the turn-around time for parts programming is substantially reduced. The VNC-100 vocabulary is easy to learn and easy to use. There are three types of commands: supervisory commands using keyboard entry; parts programming commands using voice entry; editing commands using keyboard entry for text editing and voice entry for program editing.

The operator is free to use those words that are most natural to him to describe a particular machine tool operation. For example, when voice programming for a bolt hole circle, he may say "bolt hole", "bolt", or "BC". The VNC-100, with the use of messages on a visual display, will then sequentially prompt him through the necessary entries to complete a bolt hole circle.



THE VNC-100 SYSTEM

The VNC-100 is about the size of a desk-top office copier; it consists of a small microphone headset, visual display, speech preprocessor and a minicomputer. An ASR33 Teletype is also included in order to produce hard copy, read and punch tape. The visual display immediately verifies each spoken input and operates as a prompter to the programmer.

Optional features include high-speed tape reader, mylar-rated punch, heavy-duty high-speed printer console, CRT, graphic plotter, disc storage, and data communications.

VOICE CONTROL OF MANUFACTURING OPERATIONS

In addition to preparing tapes for a broad range of machine tools, more general purpose applications of voice data input exist in overall manufacturing management. A voice input terminal linked to a central system can provide verbal input of data, e.g., work in progress, production rates, estimating machine utilization, maintenance activities, inspection processes within the plant or from remote facilities. Not only can automatic printout and direct computer input of such information be accomplished at the management information center, but printed or visual feedback can be supplied at each voice input terminal, all without the need for a typist or a keypuncher.

Voice control of remote operations such as Direct Numerical Control (DNC) stations with little or no operating staff are ideally suited for voice operation. Voice input can be from the main DNC station or from each individual machine tool location for the purpose of editing, adding to, deleting or debugging test runs of DNC tapes. Voice control systems could be added as input stations to time-sharing systems, graphic (CAD/CAM) systems, editing stations on the floor, or for use with in-process machining lines, such as transfer machines or automatic equipment.



Threshold Technology Inc. is the international leader in the application of automatic speech recognition systems for inspection and quality control, automated material handling, numerical control, inventory and receiving, and factory data collection.

USER BENEFITS

- Reduces costs of tape preparation
- Reduces tape preparation time
- Voice input of NC parts program directly from drawings and prints
- Immediate visual verification of each programming command
- Easy-to-learn, shop-oriented programming language
- Programmer's hands are free; he has mobility to read blueprints, perform calculations, utilize other reference material, while speaking programming commands
- Handwritten or typing errors are eliminated
- Interactive prompting of programmer through programming steps
- Stand-alone, low-cost, in-house system provides better control of NC tape costs, and optimizing of tapes for more efficient machine tool utilization
- Fewer "tryout" tapes required because of reduced errors

SYSTEM CAPABILITIES

- Three-axis point-to-point and two-axis contouring processor
- Compact design and easy operation
- Interactive operations for supervisory inputs, voice programming, and editing operations
- Customized post processors
- Operating program completely contained in the VNC-100 memory
- Comprehensive error detection and reporting



FUNCTIONAL SUMMARY

Supervisory Functions

CON	Continue	MODE	Mode Selection
COR	Determine Available Storage	PTP	Select Paper Tape Punch
DIG	Set Digits of Accuracy	PTR	Select Paper Tape Reader
EXE	Execute	RES	Resume
LXL	Set Low X Limit	RUN	Run Program
LYL	Set Low Y Limit	S	Select Post Processor
LZL	Set Low Z Limit	SB	Define Setback Allowance
XLM	Set X Limit Maximum	T	Type Active Post Processor
YLM	Set Y Limit Maximum	THK	Define Material Thickness
ZLM	Set Z Limit Maximum		

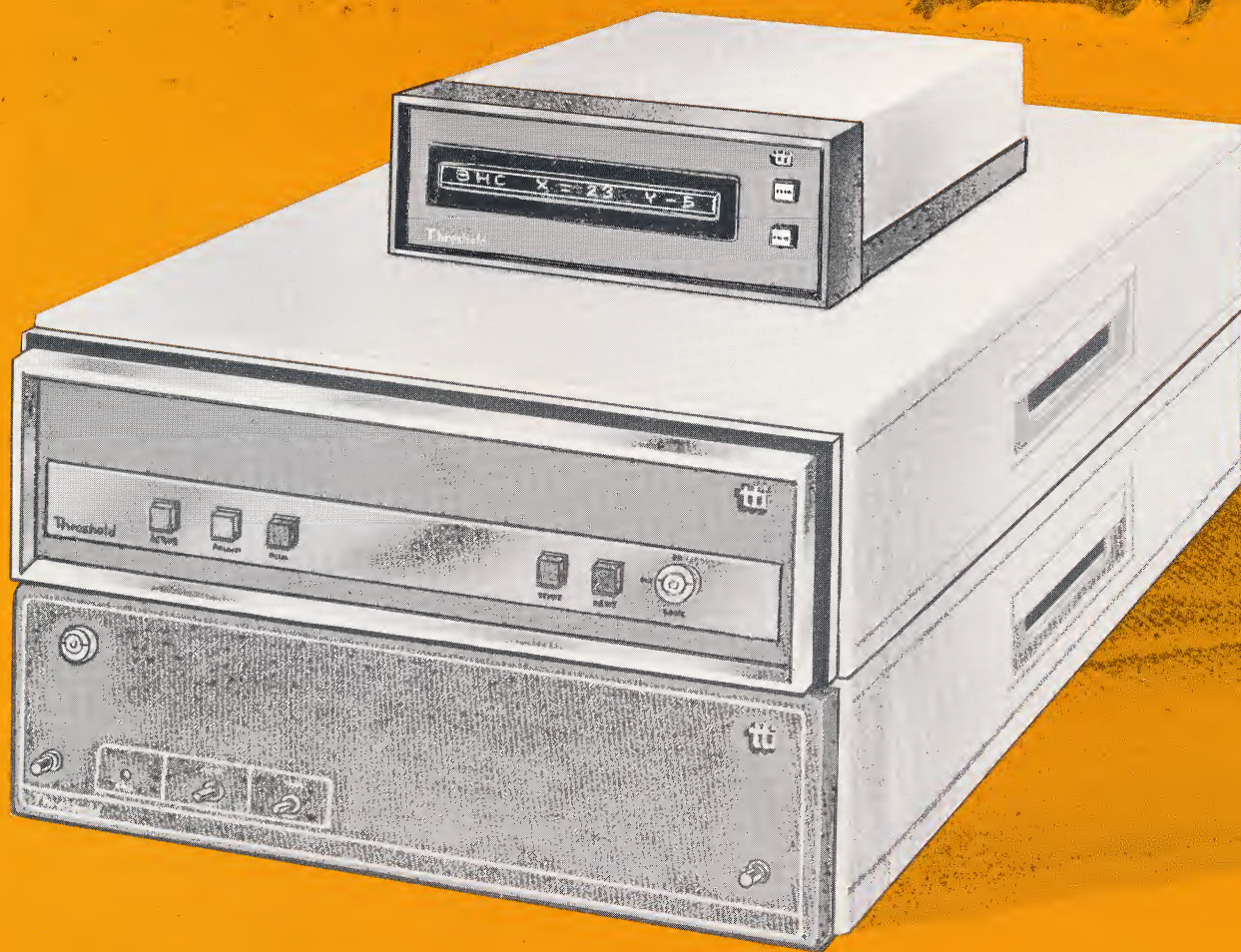
Parts Programming Functions

COORDINATE	ERASE
ARC	CANCEL
BOLT HOLE CIRCLE	GO
GRID	TERMINATE
HOLE	DIGITS 0 THROUGH 9
LINE	MINUS
OFFSET	SKIP
TRIM	PROFILE
DEFINE PATTERN	INSIDE
PATTERN	OUTSIDE
POINT (.)	HOLES
INCREMENT	AUX/MISC CODES

Editing Functions

A	Append	KIL	Clear Memory
C	Change	L	List
D	Delete	LPM	Load Permanent Memory
EPM	Edit Permanent Memory	P	Punch Tape
I	Insert	Y	Read Page of Text

..increases productivity and
manufacturing control



SPECIFICATIONS

VNC-100 SYSTEM FEATURES

- Voice input of parts program directly from print or drawing specifications
- Simple shop-oriented vocabulary
- Immediate visual verification of commands
- Interactive processing and editing
- Automatic error detection
- 3-axis point-to-point, 2-axis contouring tape preparation
- Simplified post processors
- EIA or ASCII tapes
- EIA and ASCII editing
- Programming — incremental and/or absolute
- Tape output — incremental or absolute
- Stand-alone dedicated system
- Pattern storage
- Nested pattern definitions
 - Holes in an arc (part of a BHC)
 - Bolt hole circles
 - Grids of holes
 - Holes in a line
 - Random patterns of holes
- Nested arithmetic calculations
- 2-axis profiling routines
 - Arcs
 - Circles
 - Straight and angular lines
- Setbacks for bending and material thickness allowances for punching
- Cavity profiling and punching (square or rectangular holes)

VNC-100 STANDARD SYSTEM

Standard hardware includes:

- Speech recognition and NC tape preparation processor
- Visual display — 16-character alphanumeric
- Noise-cancelling microphones mounted on headbands
- ASR 33 Teletype — includes paper tape reader/punch
- Operator and Programming Manuals
- System installation and training

OPTIONS AND PERIPHERALS

- High-speed paper tape reader/punch (Mylar-rated)
 - High-speed, heavy duty teleprinter
 - 32-character display
 - CRT display
 - Plotter
 - Disk systems
 - Wireless input for complete programmer mobility
 - FORTRAN Software
- (Additional options available on special quotation)

POST PROCESSORS

- 2-axis and 3-axis point-to-point positioning
- Popular 2-axis continuous path
- 3rd axis positioning
- Rotary axis positioning

Specifications Subject To Change

CALL THRESHOLD — WE'LL LET YOU TALK TO THE VNC-100

If you are interested in lower cost, faster methods of NC tape preparation, we'd like to set up a complete demonstration at your convenience, in your office or ours. We'll even let **YOU** talk to the VNC-100. For details, call or write to the address below.



THRESHOLD TECHNOLOGY INC.

1829 Underwood Boulevard, Delran, New Jersey 08075
(609) 829-8900 ■ (609) 461-9200

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September 15, 1975

J. Nelson, Sys.Cons.
Box 3
Schooleys Mnt., NJ 07870

Dear Sir:

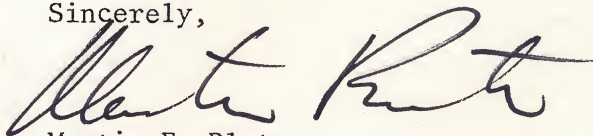
Thank you for your interest in Threshold Technology and our Voice Numerical Control system. For years man has been endeavoring to improve his control over machines. The enclosed brochures will expose you to a new dimension of machine control, man's voice.

The VNC family of systems can offer a significant reduction in cost and time for N/C tape preparation through their conversational operation and ease of preparing N/C programs.

Numerical control is just one of many applications for Threshold's voice programming systems; other applications include quality control and inspection, material sortation and source data entry. VNC systems are currently available for demonstration at our office in Delran, New Jersey or at a customer location.

If I can be of further service to you, please feel free to call.

Sincerely,



Martin F. Plute,
Industrial Marketing Manager

MFP:ah
Enclosures